

# The status of *Hipposideros galeritus* Cantor, 1846 and *Hipposideros cervinus* (Gould, 1854) (Chiroptera: Hipposideridae).

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## Introduction

Considerable taxonomic confusion has surrounded the small leaf-nosed bats of Indo-Australia allied to *Hipposideros galeritus* Cantor, 1846 from Penang Island, and numerous names have been proposed since that date for specimens or populations from this extensive region. Suggested classifications have varied from the recognition of three or more species to the definition of no more than one, the grouping of the various named forms changing accordingly. However it has long been apparent that the Bornean population of these bats seemed critical to any consideration of the groups of taxa as a whole, but for many years the relative lack of specimens from a variety of Bornean localities made critical assessment difficult. Moreover, this difficulty is compounded by much confusion in the literature.

This study was initiated through the interest of the Earl of Cranbrook (formerly Lord Medway) who obtained specimens in Sarawak while with the Royal Geographical Society Expedition to Mount Mulu, 1977–1978. These although superficially referable to *H. galeritus*, on close examination seemed to represent two very similar but nevertheless distinct taxa. They have led to a further examination of specimens ascribed to *H. galeritus* or to its nominal allies in the collections of the British Museum (Natural History) and as a result it has proved possible to attempt some clarification of the status and relationships of the majority of the named forms previously associated in one way or another with this species. Representative material of a minority of described taxa or populations is either lacking or unavailable and to this extent our conclusions must remain provisional, although even so it has been possible to advance tentative opinions. At the same time we have endeavoured to indicate through detailed synonymies the wide variety of conflicting usages and differing opinions that exist in the literature of this relatively small group of bats, of which representatives are likely to be found in the majority of collections from Indo-Australia.

## Material and Methods

One hundred and thirty-three specimens have been examined in the course of this study, all in the British Museum (Natural History) [BM(NH)]. For the most part they are identified by their registration numbers but a minority of specimens collected recently in southeastern Sulawesi has yet to be accessed and will be reported more fully in an account of the collection of which they form a part. By the courtesy of Dr C. Smeenk, we have also been able to borrow a series of critical specimens from the Rijksmuseum van Natuurlijke Historie, Leiden (RNH) which have proved very valuable. In addition, Professor J. D. Smith of California State University has generously provided measurements of a series of specimens that he obtained recently on the islands of the Bismarck Archipelago, off northeastern New Guinea. Qualitative assessments of external, cranial and dental characters are summarized in the systematic accounts. Measurements are in millimetres and were

made entirely by one of us (P.D.J.) with dial calipers. In the text those relevant in diagnosis appear with the following abbreviations:

Length of forearm	FA	
Length of 2nd phalanx of third and fifth digits	III <sup>2</sup> , V <sup>2</sup>	
Length of tail	TL	
Length of skull from canine to occipital condyle (condylocanine length)		CCL
Greatest width across zygomata	ZW	
Greatest mastoid width	MW	
Greatest diameter of tympanic annulus	TD	
Crown width across third molars	M <sup>3</sup> -M <sup>3</sup>	
Length of upper toothrow from canine to third molar inclusive		C-M <sup>3</sup>
Width of third molar	M <sup>3</sup>	

Where series of specimens have been available the range of each measurement is given, preceded in parentheses by the number examined and followed by the arithmetic mean, also in parentheses. Measurements of holotypes appear separately but are also included in the appropriate series.

### History

Although *Hipposideros galeritus* Cantor, 1846 and *H. cervinus* (Gould, 1854) are in general use as the earliest identifiable names in this small complex of bats, it is possible that both may be antedated by *Rhinolophus crumeniferus* Lesueur & Petit, 1807 (pl. 35), from Timor Island. The status of this name has been reviewed and discussed by Tate (1941 : 367, footnote, 382, 387), Laurie & Hill (1954 : 56), Oey & Feen (1958 : 230), Hill (1963 : 23) and Goodwin (1979 : 79). It is based solely on a coloured plate and no holotype appears to exist. There is very little doubt that the bats depicted belong to the *galeritus* complex and although the plate is insufficiently detailed, they are probably referable either to *galeritus* or to *cervinus*. There are no subsequent records of bats referable to either of these from Timor and for the present the name is best left unallocated.

The taxonomic history of this small but involved grouping of bats thus begins with the description of *Hipposideros galeritus* Cantor, 1846 from Penang Island, Malaya, followed in quick succession by the recognition of *cervinus* Gould, 1854 from northern Australia, *labuanensis* Tomes, 1859 from Borneo, *longicauda* Peters, 1861 from Java and, rather later, of *brachyotus* Dobson, 1874 from India. Even at this early stage, considerable differences of opinion are apparent, Peters (1871) for example separating *galeritus* subgenerically from *labuanensis*, *cervinus* and *longicauda* but Dobson (1876, 1878) synonymizing *labuanensis*, *longicauda* and *brachyotus* into *galeritus* which, like *cervinus*, he considered a valid species. This author noted variations in the size of the noseleaf, tail length and wing insertion on the hindlimb in *H. galeritus* as he understood it, considering specimens of *labuanensis* and *brachyotus* intermediate between *longicauda* at one extreme and *galeritus* at the other. However, this variation is at least partially due to the fact that his *H. galeritus* is a composite of *H. galeritus* and *H. cervinus* as we define them, although not unexpectedly some of the features to which Dobson drew attention retain diagnostic significance. His association of *labuanensis* with *galeritus*, rather than with *cervinus*, has persisted until the present day and has led to many of the difficulties encountered in classifying this group of bats, since the majority of subsequent comparisons have been made against members of the Bornean population that *labuanensis* represents, rather than *galeritus* of which few specimens are known.

Five further names have been proposed since Dobson's studies: *batchianus* Matschie, 1901 from Batjan Island in the Molucca Islands, *schneideri* Thomas, 1904 from Sumatra, the posthumously published *misorensis* Peters, 1906 probably from Misor Island (= Schouten Island) off northeast New Guinea, *insolens* Lyon, 1911 from Borneo and finally *celebensis* Sody, 1936 from Sulawesi. Among these the account by Lyon of *insolens* marks an

important point since this author found *insolens* and '*galeritus*' to occur sympatrically and thus demonstrated for the first time the existence of two distinct species in the Bornean population. Most later authors have endeavoured to recognize this in different ways but have been handicapped by the unavailability of type material, by a lack of specimens from critical areas or by reliance on the concept of *labuanensis* as representative of *H. galeritus*. On this last point for example, it seems clear from the measurements that they cite, that '*galeritus*' as understood by Lyon (1911), by Chasen (1931) when reporting specimens from Sabah or by Sody (1936) when using Bornean specimens for comparison is in fact the taxon that we recognize as *H. cervinus labuanensis*. *Hipposideros galeritus* and its allies have been listed, reviewed and discussed either entirely or in part by Chasen (1940), Tate (1941), Laurie & Hill (1954) and Hill (1963).

Chasen (1940) admitted weaknesses in his arrangement of the Malaysian members of the complex but correctly maintained two separate taxa in Borneo. He recognized two species, *H. longicauda* with *insolens* as its subspecies and *H. galeritus* with subspecies *labuanensis* and *schneideri*. Although he had at one time examined the holotype of *galeritus*, Chasen had no access to it when writing and took for comparison '*galeritus*' from Pahang which may well have been *H. cervinus labuanensis* as we understand it, leading him to associate *galeritus* with *labuanensis* and *schneideri*, rather than with *insolens* and *longicauda* which we have found to be its allies.

The first attempt at a cohesive review of the entire complex was made by Tate (1941) who presented much useful information and many useful characters for distinguishing the taxa. Unfortunately it is difficult to extract a coherent view of their classification from this rather confusing paper. The caption to the distribution map (p. 365) for the *galeritus* group provides one opinion with the recognition of four species: *H. galeritus* with subspecies *schneideri*, *H. longicauda*, *H. labuanensis* and *H. cervinus* with subspecies *insolens*, *celebensis* and *batchianus*. The text however (p. 367) offers a different view, Tate observing that for the sake of consistency with the then prevailing view that *galeritus* extends through Sumatra, Java and Borneo to Celebes, it must be further extended to include *cervinus* of New Guinea and Australia. He concludes that *brachyotus*, *labuanensis*, *insolens*, *celebensis*, *batchianus* and *cervinus* would be more or less valid subspecies of *galeritus*, with *schneideri* and *longicauda* as derived species. Later (p. 369) he reaffirms that *cervinus*, *batchianus*, *celebensis* and *insolens* are no doubt conspecific but remarks that *labuanensis* and *schneideri* are good species. Finally (p. 391) *labuanensis*, *celebensis* and *cervinus* (also on p. 392) are considered subspecies of *galeritus* but *insolens* and *schneideri* distinct species. Moreover (p. 391) he reports both *galeritus* and *schneideri* from North Pagi Island in the Mentawai Islands.

Tate (p. 367) also suggested that the holotype of *H. galeritus* consisted of a mismatched skin and skull, although apparently he only saw a photograph of the skull and had not examined the skin but instead relied upon Cantor's description. He considered that the skin had distinct affinities with *cervinus* but that the skull appeared to be that of a bat of the *bicolor* group. As a result he designated the skin as the type of Cantor's name. This opinion was accepted by Laurie & Hill (1954) and more particularly by Hill (1963) who concluded that the skull agreed closely with that of the cranially similar species *H. ater*, a member of his *bicolor* subgroup, otherwise readily distinguished from *H. galeritus* by the absence of lateral supplementary leaflets. Subsequent examination has shown clear cranial differences between *H. ater* and *H. galeritus* and with the advantage of additional specimens from Malaya and Thailand, that agree closely both externally and cranially with the holotype of *galeritus*, we have been able to establish that these assumptions are erroneous and that it is very unlikely that any mismatch has occurred.

Laurie & Hill (1954) endeavoured to reconcile the varying opinions advanced by Tate with the specimens then available in the British Museum (Natural History) although concerned chiefly with New Guinea and Sulawesi. These authors recognized two species, *H. galeritus* extending eastwards perhaps to Sulawesi, *H. cervinus* from Borneo to the Solomon Islands, with subspecies *insolens*, *celebensis* and *batchianus*. They considered the eastern



*cervinus* to be slightly less specialized than the western *galeritus* and its allies and, although differing in detail, their concept has elements in common with that advanced in this paper.

Hill (1963) in reviewing the complex as a whole, adopted much of the treatment by Laurie & Hill and carried it further in uniting *galeritus* and *cervinus* into one species, *galeritus*, of which all other forms were made subspecies; *insolens* becoming a synonym of *labuanensis*, their differences being thought to reflect individual variation. This arrangement has been widely accepted but proves to be incorrect.

### Systematic Section

The review by Hill (1963, p. 19) of the *galeritus* subgroup and (p. 52) of *H. galeritus* as this author understood it provides an account of the major external, cranial and dental features of bats here attributed to *H. galeritus* or *H. cervinus* but since it is based on a composite of both further definition is needed.

#### *Hipposideros galeritus* Cantor, 1846

DIAGNOSIS AND DESCRIPTION. Antitragus subangular, tall, nearly one third of ear length in height; antitragal projection absent (a small antitragal fold towards rear of antitragus may suggest an antitragal projection but disappears when ear is flattened); internarial septum linear, slightly swollen (Fig. 1); upper margins of narial lappets slightly lobed; intermediate leaf simple, slightly inflated medianly, expanded laterally to form a small lappet on either side, nearly as wide or wider than posterior leaf; wing elements relatively long; tail long; generally five caudal vertebrae (exceptionally four or six); tail membrane large and extensive.

Skull with long braincase and short toothrow relative to condylocanine length (Fig. 2); rostrum inflated, in profile swollen above interorbital region which is very constricted and shortened anteroposteriorly, with an angular outline when viewed from above; zygomata slender with prominent, short, abruptly rising jugal process; greatest zygomatic width generally less or subequal to mastoid width; anterorbital foramen subtriangular to suboval;

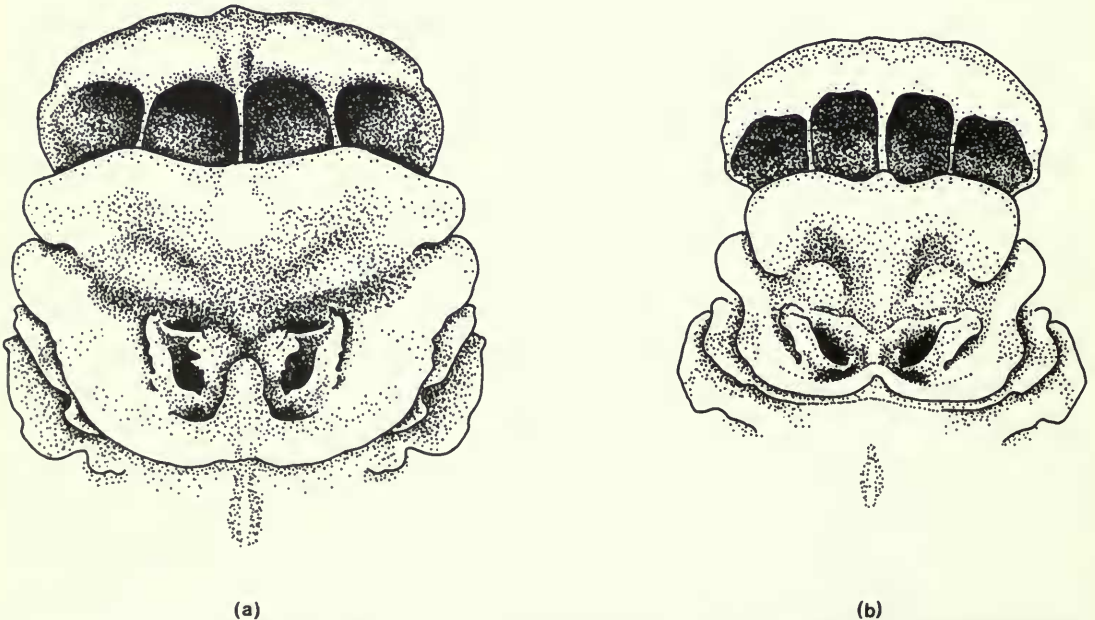
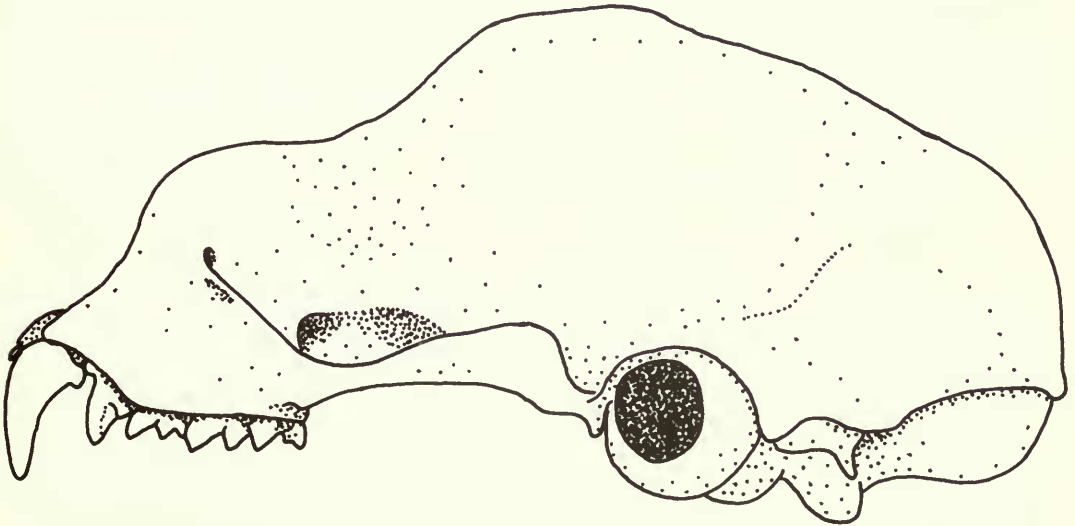


Fig. 1 Frontal view of noseleaf of: (a) *Hipposideros galeritus insolens*; (b) *Hipposideros cervinus labuanensis*.

braincase globose, frontal and parietal regions divided by a shallow depression; interparietal moderately swollen; mastoid well developed; post-palatal spicule obsolescent or absent; anterior sphenoidal ridges equal in length to posterior ridges to enclose a diamond-shaped sphenoidal depression; width of cochleae exceeding their distance apart, each one third concealed by a large tympanic annulus whose greatest diameter (2.70–3.00 [2.83]) is a little less than or approximately equal to the distance between the annuli across the sphenoidal



(a)



(b)

Fig. 2 Lateral view of the skull of: (a) *Hipposideros galeritus galeritus*; (b) *Hipposideros cervinus labuanensis*.

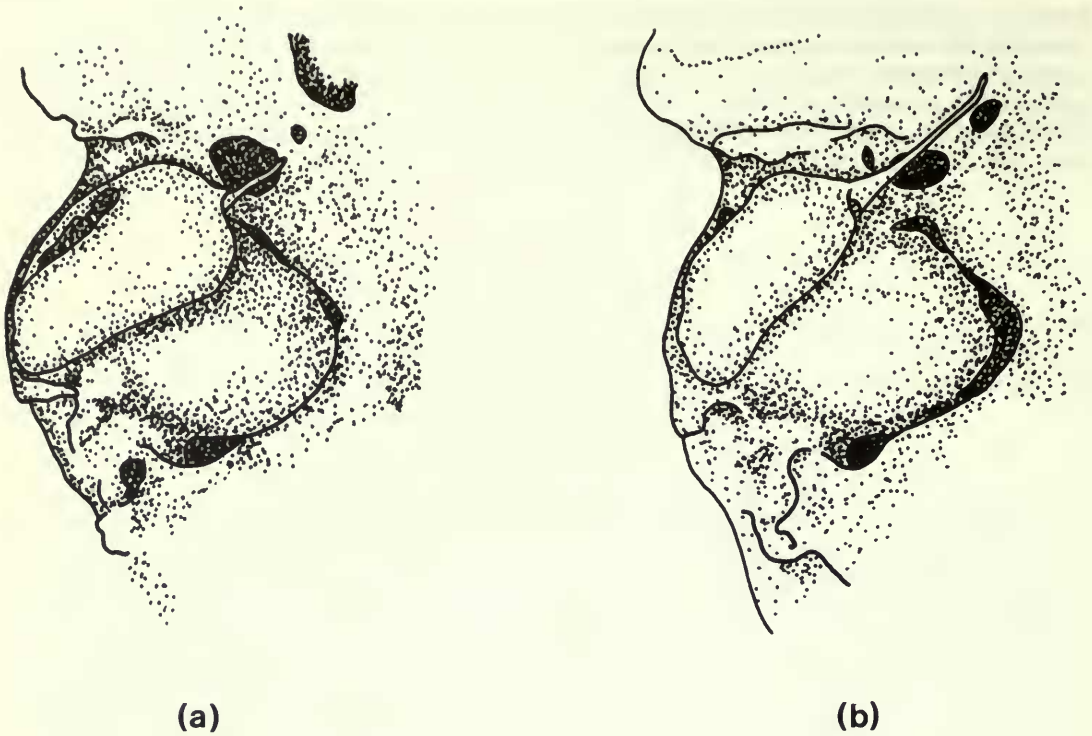


Fig. 3 Ventral view of external structure of right auditory region of skull of: (a) *Hipposideros galeritus insolens*; (b) *Hipposideros cervinus labuanensis*.

depression (except in *H. g. longicaudus* see discussion of this subspecies), annulus acutely angled to longitudinal axis of skull (Fig. 3); upper incisors bicuspid, outer lobes sometimes small;  $M^3$  with well developed third commissure, fourth commissure small but evident; crown area of inner lower incisors less than crown area of outer pair.

DISTRIBUTION. India and Sri Lanka to Borneo and Java.

#### *Hipposideros galeritus galeritus* Cantor, 1846

*Hipposideros galeritus* Cantor, 1846 : 183 (Pinang [= Penang I., Malaya]; Lekagul & McNeely, 1977 : 167 (Satun Province, Thailand); Tate, 1941 : 367 (discussion, lectotype designated).

*Rhinolophus (Phyllorhina) galeritus*, Wagner, 1855 : 659 (Pinang [= Penang I., Malaya]).

*Phyllorhina galerita*, Fitzinger, 1870 : 885 (Malay Peninsula; Pinang [= Penang I.]).

*Phyllorhina galerita*, Peters, 1871 : 316 (Pinang [= Penang I.]); Dobson, 1876 : 69, 1878 : 141 (in part, Pinang [= Penang I.]).

*Hipposideros galeritus galeritus*, Chasen, 1940 : 46 (in part, Malay States); Tate, 1941 : 365 (mapped), 367 (type material discussed), 391 (N. Pagi, Mentawai Is.); Laurie & Hill, 1954 : 56 (in part, Penang, Malay States); Hill, 1963 : 53 (in part, Malay Peninsula); Medway, 1969 : 29, 1978 : 29 (in part, Penang I.).

*Hipposideros galeritus* group, Tate, 1941 : 358, 360, 364 (discussed).

[*Hipposideros*] *galeritus*, Tate, 1941 : 359 (listed), 369 (discussed), 384 (type material, further discussion).

HOLOTYPE. Adult ♂ BM(NH) 79.11.21.85. Slightly damaged skin, skull in good condition but left premaxilla and incisor missing, left zygoma broken, occipital region slightly damaged. Penang Island, Malaya. Originally in Indian Museum, Calcutta.



OTHER MATERIAL. MALAYA: ♀ BM(NH) 61.1718 (in alcohol, skull extracted) Bukit Kutu, Selangor, 1061 m; THAILAND ♂♂ BM(NH) 78.2351-2 (skins and skulls) Wang Bla Chan, Muang, Satun Province.

DIAGNOSIS. As species diagnosis and description; relatively small.

Measurements of holotype: FA 46·3; III<sup>2</sup> 19·2; V<sup>2</sup> 9·5; CCL 14·0; ZW 7·9; MW 8·9; TD 2·9; M<sup>3</sup>-M<sup>3</sup> 5·6; C-M<sup>3</sup> 5·3; M<sup>3</sup> 1·2.

Measurements of the series examined: FA (4) 39·0-48·1 (43·95); III<sup>2</sup> (4) 19·0-20·7 (19·80); V<sup>2</sup> (4) 9·5-10·7 (10·15); TL (3) 36·0, 40·0, doubtfully 49·0; CCL (4) 14·0-14·5 (14·30); ZW (4) 7·9-8·3 (8·15); MW (4) 8·3-8·9 (8·68); TD (4) 2·80-2·90 (2·88); M<sup>3</sup>-M<sup>3</sup> (4) 5·5-5·7 (5·61); C-M<sup>3</sup> (4) 5·3-5·6 (5·46); M<sup>3</sup> (4) 1·20-1·35 (1·26).

REMARKS. Dobson (1876, 1878) evidently saw the holotype of *Hipposideros galeritus*, probably at the Indian Museum, Calcutta (it was presented to the British Museum (Natural History) in 1879) although (1876; 198) he does not list it from that collection. Since then it appears to have been commented upon only by Tate (1941) and Hill (1963).

Tate (1941) considered that the skin and skull of the holotype of *H. galeritus* were mismatched, although he had not examined the skin and apparently only had a photograph of the skull, and stated that the skin alone represented Cantor's type. However, the skull associated with this skin has an inflated rostrum, slender zygomata and U-shaped palation, all features distinguishing it from the *bicolor* subgroup, to which Tate and subsequently Hill (1963) thought it to belong and it is very similar to the skulls of other specimens of *H. galeritus*—as understood in this paper—from India, Sri Lanka, Thailand, Malaya and Borneo. In all, the zygomatic width is less than or subequal to the mastoid width, a feature otherwise characteristic of *H. bicolor* and its close allies. Tate also thought that the skin had affinities with *H. cervinus*. However, it has been possible to examine the ears and noseleaf in some detail after thorough soaking and there is clearly a tall, angular antitragus lacking any posterior antitragal projection, a prominent internarial septum and well developed, broad intermediate leaf, features which are characteristic of our concept of *galeritus* but not found in *cervinus*. Therefore there seems little to substantiate the contention that a mismatch of skin and skull has occurred and Tate's designation (p. 367) of the skin as the lectotype of *H. galeritus* should be discounted.

Lekagul & McNeely (1977) provided useful photographs of the noseleaf and skull, with notes on ecology and behaviour. However, those remarks extrapolated from Medway (1958) probably refer to *H. cervinus* (*H. c. labuanensis*) as understood here, rather than to *H. galeritus*.

DISTRIBUTION. MALAYA: Selangor; Penang Island. THAILAND: Satun Province.

### *Hipposideros galeritus brachyotus* (Dobson, 1874)

*Phyllorhina brachyota* Dobson, 1874 : 237 (Central India).

*Phyllorhina galerita*, Dobson, 1876 : 69 (in part, Central India; Deccan).

*Hipposideros galeritus*, Blanford, 1888 : 287 (Indian Peninsula; Ceylon [=Sri Lanka]); Brosset, 1962 : 618 (Western and Central India: Chikalda; Ellora; Kanheri; Bombay; Bedsar Caves; Badomi).

*Hipposideros brachyotus*, Wroughton, 1913 : 36 (Kanara); 1915 : 85, 101 (Bihar; Ceylon [= Sri Lanka]; Ryley, 1914 : 689 (Gujerat); Phillips, 1923a : 274, 1923b : 155, 1924 : 25, 1935 : 94 (Ceylon [= Sri Lanka]).

[*Hipposideros*] *brachyotus*, Tate, 1941 : 358 (listed), 364 (mentioned), 369 (discussed), 381 (listed, holotype).

*Hipposideros galeritus brachyotus*, Tate, 1941 : 367 (discussion); Hill, 1963 : 54 (Ceylon [= Sri Lanka]; Mysore; Bombay; Bengal).

HOLOTYPE. Adult ♂ BM(NH) 9.1.4.70. In alcohol in fair condition, wing membranes damaged, skull extracted, in good condition, right upper incisor, left upper canine and left anterior upper premolar (PM<sup>2</sup>) missing. Central India.

OTHER MATERIAL. INDIA: BM(NH) 75.11.3.3 (skin and skull) Lingasoogar, N.N.W. of

Bellary; ♂ BM(NH) 12.1.28.1–2 (in alcohol, skulls extracted) Konkan; ♂ BM(NH) 21.1.17.59 (skin and skull) Honawar, Kanara; ♂ BM(NH) 21.1.17.60 (skin and skull) Gaya, Bihar; ♀ BM(NH) 21.1.17.61 (skin and skull) Danta, Gujerat; SRI LANKA: ♂ BM(NH) 20.9.26.18 (skin and skull) Matugama; ♂ BM(NH) 21.1.17.57–58 (skins and skulls) Kala-Oya; BM(NH) 66.5525 (skin and skull) Dammeria, Passara, Uva.

DIAGNOSIS. Similar in structure and size to *H. g. galeritus* but the material available is insufficient to assess its subspecific validity.

Measurements of holotype: FA 45·6; III<sup>2</sup> 18·6; V<sup>2</sup> 12·2; TL 35·6; CCL 14·2; ZW 8·6; MW 8·7; TD 2·70; M<sup>3</sup>–M<sup>3</sup> 5·8; C–M<sup>3</sup> 5·4; M<sup>3</sup> 1·45.

Measurements of the series examined: FA (10) 44·0–48·4 (46·05); III<sup>2</sup> (10) 18·3–21·6 (17·09); V<sup>2</sup> (10) 9·3–12·2 (10·97); TL (10) 30·0–37·5 (34·08); CCL (10) 14·1–15·4 (14·67); ZW (10) 8·4–9·1 (8·76); MW (10) 8·5–9·1 (8·79); TD (10) 2·70–3·00 (2·83); M<sup>3</sup>–M<sup>3</sup> (10) 5·6–6·2 (5·88); C–M<sup>3</sup> (10) 5·3–5·9 (5·67); M<sup>3</sup> (10) 1·30–1·50 (1·43).

REMARKS. This taxon has a relatively simple historical background, different authors considering it to be either specifically distinct or a subspecies of *H. galeritus*. Phillips (1923a, 1923b, 1924, 1935) provided notes on its behaviour, reproduction and ecology in Sri Lanka, Brosset (1962) gave similar comments on Indian populations and included a frontal photograph of the head. Both maintained that these bats have been observed only as isolates or in very small family groups, Brosset considering that they avoided other species. This is an interesting point that may reflect the fact that, in contrast to *H. cervinus*, *H. galeritus* is poorly represented in trapping samples and is comparatively rare in museum collections.

DISTRIBUTION. INDIA: Gujerat; Mysore; Bihar. SRI LANKA.

### *Hipposideros galeritus insolens* Lyon, 1911

*Hipposideros insolens* Lyon, 1911 : 129 (Upper Pasir River, southeastern Borneo); Chasen, 1931 : 112 (Baturong Caves, N. Borneo); Tate, 1941 : 391 (Perboewa, N.W. Borneo).

*Hipposideros longicauda insolens*, Chasen, 1940 : 46 (Borneo).

[*Hipposideros*] *insolens*, Tate, 1941 : 359 (listed), 368 (discussed), 384 (holotype).

*Hipposideros cervinus insolens*, Tate, 1941 : 365 (mapped); Laurie & Hill, 1954 : 56 (discussed).

*Hipposideros galeritus insolens*, Tate, 1941 : 367 (discussed), 369 (systematic status).

*Hipposideros galeritus labuanensis*, Davis, 1962 : 39 (in part?, Sandakan, Borneo); Hill, 1963 : 54 (in part, Borneo); Medway, 1965 : 57, 1977 : 51 (in part, Borneo).

HOLOTYPE. Adult ♂ USNM 154389. In alcohol, skull extracted, both in good condition (Poole & Schantz, 1942). Near Lowatsi, on the Upper Pasir River, southeastern Borneo. Not seen.

OTHER MATERIAL. BORNEO: BM(NH) 0.7.29.4–7 (should be in alcohol but not found, skull only) Baram, Sarawak; 3♂ 4♀ BM(NH) 51.120–126 (in alcohol, skulls extracted) Long Lama Caves, Baram River, Sarawak; ♂ BM(NH) 59.150–1 (skins and skulls) Gua Bungoh, Bau, Sarawak; 3♀ BM(NH) 75.1896–8 (in alcohol) Niah Cave, Gunong Subis, 4th Division Sarawak; ♀ BM(NH) 78.123 (in alcohol) Gunong Mulu, Sarawak, 500 m; 3♂ 4♀ BM(NH) 78.2495–2501 (in alcohol) inland from Sangkulirang, mouth of River Baai, E. Kalimantan, 0° 59' N, 117° 58' E.

DIAGNOSIS. Larger than *H. g. galeritus* or *H. g. brachyotus* with more robust skull; interorbital region longer and less angular in shape; upper incisor occasionally with reduced outer lobe.

Measurements of the series examined: FA (19) 45·7–52·2 (48·94); III<sup>2</sup> (19) 17·1–21·9 (19·46); V<sup>2</sup> (19) 10·1–13·2 (10·81); TL (19) 28·4–37·6 (33·81); CCL (4) 14·5–15·7 (14·90); ZW (7) 9·0–9·3 (9·10); MW (6) 8·8–9·2 (8·98); TD (7) 2·75–2·90 (2·85); M<sup>3</sup>–M<sup>3</sup> (9) 6·1–6·6 (6·37); C–M<sup>3</sup> (7) 5·9–6·3 (6·19); M<sup>3</sup> (10) 1·50–1·70 (1·62).

REMARKS. Lyon (1911) distinguished *H. insolens* from *H. galeritus* (clearly = *H. cervinus*



*labuanensis* as understood here, from his measurements) by its distinctly longer forearm, tail and tibia, although he considered the skulls and dentition of the two taxa to be indistinguishable. Chasen (1931) also considered *insolens* a distinct species but later (1940) evidently revised this view and listed it as a subspecies of *H. longicauda* from Java. Despite the confusion of Tate's (1941) treatment of *insolens*, this author made an important contribution in distinguishing it from *labuanensis* and listing a number of cranial characters useful in separating the two taxa. This distinction was maintained by Laurie & Hill (1954) who regarded *insolens* as a subspecies of *H. cervinus* and *labuanensis* as a subspecies of *H. galeritus*.

More recently, Davis (1962) synonymized *insolens* and *labuanensis* but the measurements that he gave suggest that his sample consisted only of the latter and included no specimens referable to *insolens*. This view was followed by Hill (1963) who also synonymized *insolens* and *labuanensis* and further suggested that *insolens*, as understood by Lyon and Tate, might well refer to large individuals of *labuanensis*, the differences observed by Tate reflecting individual variation. However, although these features may be more variable than Tate thought, in combination with others listed above but not noted by Tate, they establish two species in Borneo, one represented by *H. galeritus insolens*, the other by *H. cervinus labuanensis*.

DISTRIBUTION. BORNEO: Sarawak; Brunei; E. & S.E. Kalimantan.

### *Hipposideros galeritus longicaudus* (Peters, 1861)

*Phyllorhina longicauda* Peters, 1861 : 708; 1871 : 321 (Surakarta, Java); 1906: pl. 5L, fig. 3 (head illustrated).

*Phyllorhina galerita*, Dobson, 1876 : 69; 1878 : 141 (in part, Java).

*Hipposideros galerita longicauda*, Sody, 1930 : 270 (C. Java).

*Hipposideros longicauda longicauda*, Chasen 1940 : 46 (Java)

[*Hipposideros*] *longicauda*, Tate, 1941 : 359 (listed), 369 (systematic status), 385 (holotype, remarks).

*Hipposideros longicauda*, Tate, 1941 : 365 (mapped), 367 (systematic status).

*Hipposideros galeritus longicauda*, Hill, 1963 : 56 (Java).

HOLOTYPE. Attempts to locate the holotype in the Museum für Naturkunde der Humboldt-Universität in Berlin (where it might be expected to be housed), the Forschungsinstitut und Natur-Museum Senckenberg, Frankfurt and the Staatliches Museum für Naturkunde, Stuttgart, have failed.

OTHER MATERIAL. JAVA: ♂♀ RNH15103-7, 15168-9, 15258, 15319, 15330 (skins and skulls) Panganderan, Central Java; ♂♀ RNH 15170, 15259 Toenggilis, West Java.

DIAGNOSIS. This taxon is poorly known with few specimens or records. As species diagnosis but averaging slightly smaller than *H. g. galeritus* and *H. g. brachyotus*, considerably smaller than *H. g. insolens* and differing from all other subspecies in having small tympanic annuli (2.4-2.5[2.46]). The most noticeable feature is the long tail of the holotype, although Sody (1930) reported four specimens which have rather shorter tails. According to this author the skulls of these Javan examples are strikingly larger than those of the Sulawesi specimens that he subsequently described (1936) as *celebensis*, although the series that we have examined does not support this.

Measurements of the holotype: FA 48 (Peters, 1861), 48.3 (Dobson, 1876); TL 44 (Peters, 1861), 40.6 (Dobson, 1876), TL of four additional specimens 32-36 (Sody, 1930).

Measurements of the series examined (skin measurements taken from dried skins): FA (II) 45.3-48.0 (46.50); III<sup>2</sup> (II) 16.5-19.2 (17.76); V<sup>2</sup> (II) 9.5-11.4 (10.64); TL not measured because vertebrae have been removed from dried skins; CCL (II) 13.6-14.4 (13.93); ZW (II) 8.1-8.6 (8.29); MW (II) 8.3-8.8 (8.53); TD (II) 2.4-2.5 (2.46); M<sup>3</sup>-M<sup>3</sup> (10) 5.4-5.8 (5.63); C-M<sup>3</sup> (II) 5.2-5.6 (5.45); M<sup>3</sup> (10) 1.3-1.45 (1.39).

REMARKS. Peters (1861) and Dobson (1876) seem to have been the only authors who have made a direct examination of the original material. There are, however, excellent drawings of the head among the posthumously published drawings of Peters (1906) which, with the original account, establish *longicaudus* as a member of the *galeritus/cervinus* complex. It has a tall, subangular antitragus and large noseleaf, with prominent internarial septum and broad intermediate leaf, all features which with the long tail are characteristic of *H. galeritus*. A small projection illustrated towards the rear of the antitragus may be an antitragal projection similar to that of *H. cervinus* but may equally result from a fold in the ear membrane, disappearing when the ear is flattened. Such a fold is found in some individuals of *H. galeritus*. The illustration by Peters may not be based on the specimen measured in his original account, since he appears to have had more than one example. The frontal pit in males is described by Peters (1861) yet Dobson (1876) stated that he had examined the adult female type, indicating the existence of at least two specimens. Chasen (1940) and Tate (1941) regarded *H. longicauda* as a distinct species; Tate considered that it agreed with the *galeritus* group but was probably atypical.

DISTRIBUTION. JAVA: central and west.

### *Hipposideros cervinus* (Gould, 1854)

DIAGNOSIS AND DESCRIPTION. As in *H. galeritus* but antitragus rounded, short, approximately one-eighth of ear length in height; an acutely pointed antitragal projection; internarial septum low, narrow, not swollen (Fig. 1); narial lappets well developed, not lobed; intermediate leaf slightly inflated dorsally, slightly expanded laterally, narrower than either anterior or posterior leaves; forearm, distal phalanges and tail not especially lengthened; usually four caudal vertebrae, sometimes five, rarely six.

Skull with short braincase and long toothrow relative to condylocanine length (Fig. 2); rostrum only slightly inflated, in profile normally level with interorbital region, with a rounded outline when viewed from above; zygomatic with rather long, gradually sloping jugal process; zygomatic width greater than mastoid width; anterorbital foramen suboval to ellipsoidal; interparietal only slightly swollen; mastoid uninflated; a blunt median post-palatal spicule sometimes present; anterior sphenoidal ridges longer than posterior ridges to enclose a pyriform sphenoidal depression; cochleae only slightly wider than their distance apart; tympanic annulus overlaying less than one quarter of the cochlea; greatest diameter of annulus (2.05–2.65 [2.36]) one half to three quarters of the distance between the annuli across the sphenoidal depression; annulus shallowly angled to longitudinal axis of skull (Fig. 3); upper incisors small, at most only weakly bicuspid, with rounded inner lobe, outer lobe when present minute; M<sup>3</sup> slightly reduced, third commissure shortened; fourth commissure absent; crown area of inner lower incisor equal to or slightly less than crown area of outer tooth.

DISTRIBUTION. Malaya, Sumatra and Phillipine Islands east to New Hebrides.

### *Hipposideros cervinus cervinus* (Gould, 1854)

*Rhinolophus ?cervinus* Gould, 1854; pl. 34 (Cape York and Albany I., Australia).

*Rhinolophus (Phyllorrhina) cervinus*, Wagner, 1855 : 661 (Cape York and Albany I., Australia).

*Phyllorrhina cervina*, Fitzinger, 1870 : 873 (Cape York and Albany I., Australia); Peters, 1871 : 321 (in part, Cape York and Albany I., Australia; Aru I.).

*Phyllorrhina cervina*, Dobson, 1878 : 142 (Cape York and Albany I., Australia; Aru Islands; Waigiou Island; New Guinea).

*Hipposideros galerita galerita*, Sody, 1930 : 267 (Mampogrotto, S. Celebes [= Sulawesi]).

*Hipposideros cervinus*, Sanborn, 1931 : 24 (New Guinea: Marienberg; Santa Cruz Is.: Fenvaloa; New Hebrides: Espiritu Santo, Efate, Malo); Sanborn & Nicholson, 1950 : 331 (New Hebrides: Espiritu Santo).

- Hipposideros celebensis* Sody, 1936 : 47 (Mampoe Cave, S. Celebes [= Sulawesi]).
- (?) *Hipposideros galeritus galeritus*. Shamel, 1940 : 354 (Peling [= Peleng] I.; Gimpoe or Bada, Celebes [= Sulawesi]).
- [*Hipposideros*] *cervinus*, Tate, 1941 : 359 (listed), 368 (discussed, S. New Guinea: Fly R.; Aru I.; New Hebrides); 381 (holotype).
- Hipposideros cervinus cervinus*, Tate, 1941 : 365 (mapped), 369 (systematic status); Laurie & Hill, 1954 : 56 (New Guinea; Japen [= Jobi] I.; Kei Is.; Aru Is.; Trobriand Is.; Kiriwina; Bismarck Archipelago: New Ireland; Solomon Is., Guadalcanar, Bougainville); Hill, 1956 : 78 (Solomon Is.: Rennell); McKean, 1972 : 26 (New Guinea: Papua).
- Hipposideros cervinus celebensis*, Tate, 1941 : 365 (mapped); Laurie & Hill, 1954 : 57 (Celebes [= Sulawesi]).
- Hipposideros galeritus cervinus*, Tate, 1941 : 367 (discussed), 391 (New Guinea: W. Irian), 392 (variation); Hill, 1963 : 57 (New Guinea: Waigeo I.; Japen [= Jobi] I.; Kei Is.; Aru Is.; N. Australia; Bismarck Archipelago: New Ireland; Trobriand Is.: Kiriwina; Solomon Is.: Bougainville, Guadalcanar, Fauro, Russell, Rennell; Santa Cruz Is.: Vanikoro; New Hebrides: Espiritu Santo, Efate, Fenvaloa); Hill, 1971 : 574 (Solomon Is.: San Jorge I.).
- [*Hipposideros*] *celebensis*, Tate, 1941 : 359 (listed), 368 (S. Celebes [= Sulawesi]), 381 (holotype).
- Hipposideros galeritus celebensis*, Tate, 1941 : 367 (discussed), 369 (systematic status), 391 (S. Celebes [= Sulawesi]); Hill, 1963 : 56 (Celebes [= Sulawesi]).
- Hipposideros galeritus labuanensis*, Laurie & Hill, 1954 : 56 (in part, ? extending to Celebes [= Sulawesi]).
- Hipposideros galeritus*, Koopman, 1979 : 9 (Karkar I., Crown I., off N.E. coast of New Guinea; Bismarck Archipelago: New Britain).

**HOLOTYPE.** Adult ♀ BM(NH) 55.11.7.13. Skin in good condition, rostrum and mandible of skull. Caves on Albany Island, Cape York, N. Australia.

**OTHER MATERIAL.** AUSTRALIA: BM(NH) 55.11.7.12. (skull), ♀ BM(NH) 7.1.1.304 (skin and skull), ♀ BM(NH) 26.3.11.203 (in alcohol) Cowal Creek, ♀ BM(NH) unregistered (in alcohol) Cape York; NEW HEBRIDES: 1♂ 3♀ BM(NH) 73.1361-4 (in alcohol, skulls extracted) Amok, Malekula Is., ♂♀ BM(NH) unregistered (in alcohol, skulls extracted) Espiritu Santo; SANTA CRUZ Is.: ♂ BM(NH) 55.359 (skull) Vanikoro; SOLOMON ISLANDS: 2♂ 1♀ BM(NH) 87.1.18.13-15 (in alcohol, skulls extracted) Fauro I, ♂ BM(NH) 88.1.5.27 (in alcohol, skull extracted) Aola, Guadalcanar, ♂♀ BM(NH) 33.11.11.3-4 (skins and skulls) Talena, Russell I., ♀ BM(NH) 54.883 (skin and skull) Rennell I., 11♂ 13♀ BM(NH) 67.2063-86 (in alcohol, skulls extracted) Talise, San Jorge I.; TROBRIAND ISLANDS: ♀ BM(NH) 96.10.5.11 (in alcohol, skull extracted) Kiriwina; BISMARCK ARCHIPELAGO: BM(NH) 77.7.18.12 (skin and skull) New Ireland; NEW GUINEA: BM(NH) 50.12.16.1-2,5 (skins and skulls), BM(NH) 86.11.3.7-8 (skins and skulls) Jobi I., 4♂ 2♀ BM(NH) 97.8.7.10-15 (in alcohol, skulls extracted) Haveri, BM(NH) 10.7.16.10 (skull) Arfak Mts., 8♂ 8♀ BM(NH) 33. 6.1.10-25 (in alcohol, skulls extracted), BM(NH) 69.325 (skin and skull) Javavere Caves, Papua, ♂♀ BM(NH) 69.326-7 (skins and skulls) E. of Port Moresby, Papua, 6♂ 8♀ BM(NH) 80.618-631 (in alcohol) Siboma, Morobe Province; ARU ISLAND: + 16♂ + 10♀ BM(NH) 10.3.2.4-37 (in alcohol and skins and skulls) Wasi; KEI ISLAND: ♂♀ BM(NH) 99.12.14.9-10 (in alcohol, skulls extracted); SULAWESI: 2♂ 3♀ BM(NH) unregistered (in alcohol, skulls extracted), paratypes of *H. celebensis* ♂♀ RNH 29297, 29303 (skins and skulls) Mampoe Grot, 20 km from Watoe Pone.

**DIAGNOSIS.** As species diagnosis and description. Variable in size but generally relatively small. Specimens from Sulawesi, Aru and Kei Islands have a blunt post-palatal spicule which is lacking in those from New Guinea, Cape York, Solomon Islands and New Hebrides.

Measurements of holotype: M<sup>3</sup>-M<sup>3</sup> 6.3; C-M<sup>3</sup> 6.0; M<sup>3</sup> 1.7.

Measurements of the series examined: FA (37) 40.4-48.2 (45.70); III<sup>2</sup> (37) 14.6-18.8 (16.81); V<sup>2</sup> (37) 8.7-11.1 (10.02); TL (37) 22.8-31.0 (27.16); CCL (25) 13.8-15.6 (14.44); ZW (26) 8.7-10.0 (9.18); MW (25) 8.2-9.2 (8.64); TD (24) 2.15-2.60 (2.29); M<sup>3</sup>-M<sup>3</sup> (27) 5.7-7.0 (6.27); C-M<sup>3</sup> (27) 5.5-6.3 (5.91); M<sup>3</sup> (27) 1.4-1.7 (1.51).

**REMARKS.** Dobson (1878) distinguished *H. cervinus* from *H. galeritus*, with which he



synonymized *labuanensis*, here regarded as a subspecies of *cervinus*. Among more recent authors, Tate (1941) provided comments on a number of specimens from New Guinea and remarked that two colour phases occurred, one red the other grey, and that there was some geographical variation in size. This author variously considered *cervinus* a valid species or a subspecies of *H. galeritus*. Laurie & Hill (1954) attempted to formalize the uncertainties of Tate's taxonomic treatment of *cervinus*, considering it a distinct species closely allied to *H. galeritus*.

Initially Sody (1930) referred Sulawesi specimens to *H. galeritus galeritus* but after comparison with specimens he thought represented Bornean *galeritus*, he decided (1936) that the Sulawesi specimens were specifically distinct, naming them *H. celebensis*. It is impossible to determine the identity of his comparative material from the measurements cited and it may have consisted of *H. cervinus labuanensis*, *H. galeritus insolens* or even a mixture of both. No morphological characters are described in either account. Some of the measurements given by Sody for *celebensis*, such as the length of the tail, the zygomatic and mastoid widths and the length of the upper toothrow are apparently comparable with those used in this study. However our measurements of two of the paratypes of *celebensis* conflict with those quoted by Sody, for instance the upper toothrow length which we find greater than given by Sody while the zygomatic and braincase breadths are less than his values. Since the two paratypes unquestionably belong to *H. cervinus*, agreeing closely with specimens of this species obtained recently in Sulawesi, it seems reasonable to assume that the entire series of *celebensis*, including the holotype, also belong to *H. cervinus*.

Shamel (1940) recorded specimens (in the National Museum of Natural History, Washington) from Sulawesi and Peleng Island as *H. galeritus galeritus* but gave no diagnostic information, although Tate later observed (1941 : 368) that the Peleng Island specimens exactly resembled *celebensis*. Tate stated that a series of specimens (in the American Museum of Natural History, New York) from S. Sulawesi, which he also referred to *celebensis*, agreed in most respects with *insolens* although smaller in size but approached *labuanensis* in a shorter M<sup>3</sup> with an incomplete cusp pattern. Tate allocated *celebensis* variously to *H. galeritus* (p. 367, 369, 391) or to *H. cervinus* (p. 365) and it is impossible from these remarks to decide to which species these specimens from Peleng Island and Sulawesi belong or if they are a mixture of both species. Only further examination will determine their status. Laurie & Hill (1954) treated *celebensis* as a subspecies of *H. cervinus* but suggested that the specimens recorded by Shamel seemed most likely to belong to *labuanensis* (which they considered to be a subspecies of *galeritus*), evidently assuming that two species occur on Sulawesi. Our investigations suggest that only one species, *H. cervinus cervinus*, occurs there.

**DISTRIBUTION.** The majority of islands and island groups from Sulawesi to the New Hebrides and North Australia.

### *Hipposideros cervinus labuanensis* (Tomes, 1859)

*Phyllorrhina labuanensis* Tomes, 1859 : 537 (Labuan I. and Sarawak, Borneo).

*Rhinophylla labuanensis*, Gray, 1866 : 82 (no locality given).

*Phyllorrhina labuanensis*, Peters, 1871 : 321 (Labuan I. and Sarawak, Borneo).

*Phyllorrhina galerita*, Dobson, 1876 : 69, 1878 : 141 (in part, Labuan I., Borneo).

*Hipposideros galeritus*, Thomas, 1895 : 108 (Engano I., W. of Sumatra); Lyon, 1911 : 129 (Pangbangan I., Pangkallahan River, upper Pasir River, Borneo).

*Phyllorrhina speoris*, Jentink, 1897 : 52 (C. Borneo).

*Hipposideros schneidersi* (misprint = *schneideri*) Thomas, 1904 : 722 (Sukaranda, Sumatra); Tate, 1941 : 367, 369 (systematic status), 391 (N. Pagi I., Mentawai Is.).

*Hipposideros galeritus galeritus*. Chasen, 1931 : 111 (N. Borneo); Chasen, 1940 : 46 (in part, Malay States; Rhio [= Riouw] Archipelago; Banka I.; S. Natuna Is.); ? Sanborn, 1952; 104 (Mindanao I., Philippine Is.); Laurie & Hill, 1954 : 56 (in part, Malay States); Davis, 1961 : 90 (Malaya); Hill, 1963 : 53 (in part, Malay Peninsula; Riau [= Riouw] Archipelago; Banka; S. Natuna Is.); Medway, 1969 : 29, 1978 : 29 (in part, Malaya; Singapore I.).

*Hipposideros galeritus labuanensis*, Chasen, 1940 : 47 (Borneo); Tate, 1941 : 367 (systematic status),

391 (N.W. Borneo); Laurie & Hill, 1954 : 56 (in part, Borneo); Davis, 1962 : 39 (Borneo); Hill, 1963 : 54 (in part, Borneo; Labuan I.; Mindanao I. Philippine Is.); Medway, 1965 : 57, 1977 : 51 (in part, Borneo).

*Hipposideros galeritus schneideri*, Chasen, 1940 : 47 (Sumatra; ? Engano I.); Tate, 1941 : 365 (mapped); Hill, 1963 : 54 (Sumatra; Engano I.; Sipora I.; N. Pagi, Mentawai Is.).

[*Hipposideros*] *labuanensis*, Tate, 1941 : 359 (listed), 368 (discussed), 385 (holotype).

[*Hipposideros*] *schneideri*, Tate, 1941 : 359 (listed), 368 (discussed; Sumatra, Pagi), 389 (holotype).

*Hipposideros labuanensis*, Tate, 1941 : 365 (mapped), 369 (systematic status).

HOLOTYPE. Adult BM(NH) 7.1.1.305. Skin in good condition, skull lacking premaxillae, cranium damaged. Labuan Island, Borneo.

OTHER MATERIAL. BORNEO: 4♂ 3♀ BM(NH) 47.3.4.7–14 (in alcohol, skulls extracted), ♂♂ ♀♀ BM(NH) 56.9.19.4, BM(NH) 7.1.1.306, BM(NH) 11.1.18.6, BM(NH) 61.1046–9 (skins and skulls) Sarawak, ♂♂ ♀♀ BM(NH) 91.2.3.2, BM(NH) 0.7.29.6–7c, BM(NH) 4.8.6.1, BM(NH) 8.1.27.29–30 (in alcohol and skins and skulls) Baram, Sarawak, 2♂ BM(NH) 95.11.5.2–3, 6♂ BM(NH) 8.1.27.36–41, 2♂ 1♀ BM(NH) 59.157–9, 3♂ 6♀ BM(NH) 62.2118–26 (in alcohol and skins and skulls) Miri, Baram River, Sarawak, 8♂ 19♀ BM(NH) 51.88–114 (in alcohol and skins and skulls) Long Lama Caves, Baram River, Sarawak, 2♀ BM(NH) 92.9.6.24–25 (in alcohol, skulls extracted) Mt. Pisang, ♂ BM(NH) 92.9.6.26, 6♂ BM(NH) 22.10.23.1–6, 2♂ BM(NH) 58.26–7, 2♀ BM(NH) 59.155–6, ♀ BM(NH) 69.232, ♂ ♀ BM(NH) 75.1899–1900 (in alcohol and skins and skulls) Niah Cave, Sarawak, ♀ BM(NH) 92.10.2.3 (skin and skull) Mt. Dulit, BM(NH) 94.9.29.14–15, ♂ ♀ BM(NH) 78.119–120 (in alcohol, skulls extracted) Gunong Mulu, 2♂ BM(NH) 57.471–2 (in alcohol) Gomanton Caves, ♀ BM(NH) 64.38 (in alcohol) Kuching, Sarawak, ♂ ♀ BM(NH) 78.121–2 (in alcohol) Sungei Buloh, BM(NH) unregistered (in alcohol) Bidi Caves, Sarawak. MALAYA: BM(NH) 55.5.3.10 (skin and skull) Singapore, 110♂ 25♀ BM(NH) 60.1706–1840 (in alcohol, skulls extracted) Bukit Lagong Forest Reserve, Kepong, ♂ BM(NH) 61.1717 (in alcohol) Pulau Kaban, E. coast of Johore, ♂ BM(NH) 62.714 (in alcohol, skull extracted) Ulu Gombok, Selangor, ♂ ♀ BM(NH) 67.1602–3 (in alcohol and skin and skull) Gunong Benom, Pahang. RIOUW ARCHIPELAGO: 2♂ 1♀ BM(NH) 9.4.1.67–9 (skins and skulls) Karimon I. SUMATRA: ♂ BM(NH) 4.4.1.2 (in alcohol, skull extracted) Upper Langkat, Holotype of *H. schneideri* ♀ BM(NH) 7.1.9.4 (in alcohol) Soekaranda, ♀ BM(NH) 24.6.12.1 (in alcohol) Lebong Tandai, Benkalen Reserve, ♀ BM(NH) 94.1.7.5 (in alcohol, skull extracted) Engano Island, ♀ BM(NH) 95.1.9.5 (in alcohol) Simatobe, Sipora.

DIAGNOSIS. Larger on average than *H. c. cervinus*. Specimens from Malaya and Borneo have a blunt post-palatal spicule which is lacking in those from Sumatra.

Measurements of holotype: M<sup>3</sup>–M<sup>3</sup> 7.0; C–M<sup>3</sup> 6.7; M<sup>3</sup> 1.75.

Measurements of the series examined: FA (32) 43.7–51.8 (47.81); III<sup>2</sup> (32) 14.4–18.3 (16.58); V<sup>2</sup> (31) 7.8–10.5 (9.43); TL (32) 18.5–26.8 (22.7); CCL (10) 15.2–16.2 (15.78); ZW (14) 9.3–10.4 (9.91); MW (11) 9.0–9.5 (9.21); TD (12) 2.40–2.65 (2.50); M<sup>3</sup>–M<sup>3</sup> (15) 6.5–7.2 (6.83); C–M<sup>3</sup> (16) 6.1–6.7 (6.45); M<sup>3</sup> (16) 1.60–1.80 (1.75).

REMARKS. Much of the confusion between *H. galeritus* and *H. cervinus* originates from Dobson (1876) who erroneously synonymized *labuanensis* with *galeritus* and who suggested (1878) that *labuanensis* was an intermediate form between *galeritus* at one extreme and *longicauda* at the other. There is every indication in the accounts by Lyon (1911), Chasen (1931, 1940) and Davis (1962) that the specimens of 'galeritus' used in their discussions and comparisons of this species with *insolens* were actually representatives of *H. cervinus labuanensis*. Consequently, the specimens recorded by Sanborn (1952) from the Philippine Islands, should also be referred to *H. c. labuanensis* or represent a closely related taxon, since Sanborn stated that his specimens agreed with (unspecified) descriptions of *galeritus* and with Lyon's (1911) measurements.

Tate (1941) generally regarded *schneideri* as a distinct species (pp. 367, 369, 391) although he mapped it (p. 365) as a subspecies of *H. galeritus*, while Chasen (1940), Laurie & Hill

(1954) and Hill (1963) considered it a subspecies of *H. galeritus*. The Sumatran specimens examined are very similar to *H. cervinus labuanensis*, to which they are referred. Thomas (1904) separated *schneideri* from 'galeritus' because of small differences in the premolar dentition but these appear to be the result of individual variation and are within the range of *H. cervinus*.

Medway (1958) provided a useful account of roosting and flight behaviour in Borneo which probably applies to *H. c. labuanensis*, although it is possible that his remarks refer in part to *H. galeritus insolens* since the two sometimes occur in the same caves. However, *insolens* is much less common in collections and may be solitary or live in small groups (c.f. *H. g. brachyotus*) and if so is unlikely to form part of the swarms described by Medway.

DISTRIBUTION. Malay Peninsula and Sumatra to Borneo and possibly the Philippine Islands.

### *Hipposideros cervinus batchianus* Matschie, 1901

*Hipposideros batchianus* Matschie, 1901 : 273 (Batjan I.)

[*Hipposideros*] *batchianus*, Tate, 1941 : 359 (listed), 381 (holotype).

*Hipposideros galeritus batchianus*, Tate, 1941 : 367, 369 (systematic status), 392 (Batjan); Hill, 1963 : 56 (Batchian I. [= Batjan I.]).

*Hipposideros cervinus batchianus*, Tate, 1941 : 365 (mapped), Laurie & Hill, 1954 : 57 (Batchian I. [= Batjan I.]).

HOLOTYPE. In the Museum für Naturkunde der Humboldt-Universität zu Berlin. Adult ♀, number 15 628, skin and skull. Batjan Island. Not seen.

OTHER MATERIAL. None seen.

DIAGNOSIS. Measurements given by Matschie suggest that *H. c. batchianus* is similar in size to *H. c. cervinus*.

Measurements of the holotype taken from Matschie (1901): FA 47·5; III<sup>2</sup> 12; V<sup>2</sup> 8·5; TL 25; ZW 10; Temporal breadth from the auditory aperture 8·2; C-M<sup>3</sup> 6·4.

DISTRIBUTION. MOLUCCA Is.: Batjan I.

### *Hipposideros cervinus misorensis* (Peters, 1906)

*Phyllorhina cervina* var. *misorensis* Peters, 1906: pl. 5L, fig. 4 (probably Misor I. [= Schouten I.], New Guinea).

HOLOTYPE. Based solely on the plate by Peters, its original specimen probably in the Museum für Naturkunde der Humboldt-Universität zu Berlin, but not traceable February 1981.

OTHER MATERIAL. None seen.

REMARKS. The status of this taxon cannot be evaluated from the plate upon which it is based, beyond remarking that the noseleaf closely resembles that of *H. cervinus*, with which *misorensis* is provisionally associated.

## Summary of taxonomic changes

The following taxa have been discussed and are listed below with their synonyms in brackets: *Hipposideros galeritus galeritus*, *H. g. brachyotus*, *H. g. insolens*, *H. g. longicaudus*, *H. cervinus cervinus* (*celebensis*), *H. c. labuanensis* (*schneideri*), *H. c. batchianus*, *H. c. misorensis*.

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